

Distribution of Orthoptera in Relation to the Anatolian Diagonal in Turkey**Battal Çiplak, Ali Demirsoy & A. Nihat Bozcuk****Abstract**

In this work, Turkey's Orthoptera fauna were evaluated in relation to a possible break due to the hypothetical Anatolian Diagonal. Among the total 480 taxa (species-subspecies) of the Asia Minor 27% were found only in the East, 44% only in the West, 6% over the Diagonal and lastly 23% on both sides. In conclusion, it was found that 71% of the Anatolian Orthoptera show the diagonal-specific distribution. The similarity between Eastern and the Western taxa is about 29%. The possible reasons for this break were discussed.

Introduction

Various subpopulations of insects were produced in Anatolia for all insect groups due to the fact that Anatolia (Asia Minor) is a mountainous land and for the presence of various climate types (DEMIRSOY & DUMONT 1988). This explains why Anatolia is a richer district than other palearctic subregions in relation to the faunal diversity. This fact makes it of course more difficult to determine the faunal structure of Anatolia clearly. The clear determination of the faunal structure of the Anatolia will contribute to a large extent the classification of species dispersed over palearctic both in the past and in the present as well.

If we consider paleogeological changes and the present topographical structure of Anatolia in order to understand Anatolian faunal structure we believe that it is necessary to know another characteristic (ÇIPLAK & DEMIRSOY 1991): That is the topographical effect produced by the "Anatolian Diagonal Line" on the elements of flora and fauna of Turkey which were originally suggested by DAVIS (1971), and special importance paid recently on it by some botanists (EKIM & GÜNER 1986) and zoologists (DEMIRSOY & DUMONT 1988; ÇIPLAK & DEMIRSOY 1991).

Anatolia is divided by this diagonal belt which is a massive structure formed by continuous mountains from the North-East towards the South-West as well as from the East to the West. This line perfectly isolated many East and West Anatolia species of organisms just from the beginning of geological origination since miocene-pliocene.

Especially in those species whose ability of motion is limited (immobile passively or actively) or in species with limited ecological valence, the isolation continued very effectively.

It is necessary to know the population of living organisms of both sides and the determination of the specific localities by which gene pools (if existed) could come in contact from both regions. All these will contribute a clear diagnosis of species in this region.

Turkey's Orthoptera fauna have been determined by various workers (in various periods) in more satisfactory level than other insect groups. Since there are rich and abundant references, the discussions of the effect of the Diagonal on the Orthoptera fauna will supply new data for the existing hypothesis concerning the Diagonal. Nevertheless, these should be evaluated in conjunction with the geological history of the Diagonal, the historical distribution and the present status of Orthoptera fauna.

During the period in which shrunken Tethys Sea connected the Indian Ocean with the present Mediterranean and the Atlantic Ocean through Central Europe, naturally the fauna of the Palearctic region were also existed in Anatolia. All the animals relic of that time are today accepted as endemic forms of Asia Minor (DEMIRSOY 1979). Some of the Orthoptera in this character are as following:

Acrididae

- *Ebnerodes* sp., *Nocaracris* sp., *Tmethis* sp. and *Anothrotes* (Pamphaginae);
- *Dociostaurus cappadocicus* and *Gomphocerus* sp. - *Trydactylus irremipes* (Trydactylidae)
- *Isophya* sp. and *Poecilimon* sp. (Tettigoniidae)

According to DELATTIN (1951), in addition to the elements of special fauna of Anatolia in this period, the elements of Mediterranean subregion of the Palearctic were also present and effective. In fact today, although the following are typical Mediterranean they are dispersed all over Anatolia (DEMIRSOY 1979).

Acrididae

- *Oedipoda germanica meridionalis* (in Anatolia and Greece)
- *Dociostaurus brevicollis* (in all Mediterranean countries)
- *Tripodopola longicornis* grece (Western Anatolia and Greece)

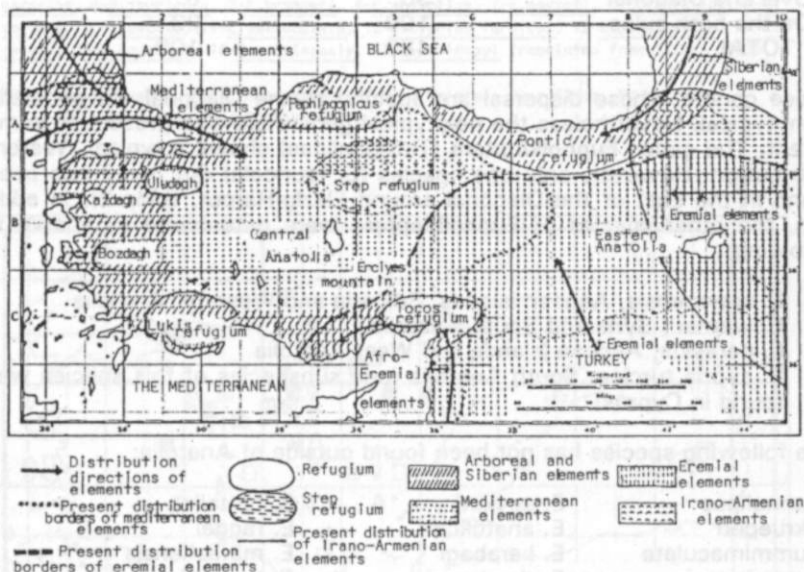
Tettigoniidae

- *Isophya*, *Poecilimon*, *Leptophyes*, *Platycleis* and *Drymedusa*

When the glacial phases started, the faunal elements existed at the North migrated towards the South via two different ways (DELATTIN 1948; KOSSWIG 1975; DEMIRSOY 1973, 1977, 1979). The first was through Caucasus towards the Irano-Caspian Refugium, and the other was through Europe towards the Macedonia-Thrace Refugium, thus they spread all over Anatolia. For the presence of a lake in the Central Anatolia then, the elements of both refugium had a contact through Northern Anatolia and Southern Anatolia mountains. After the glacial period, some moved again to the North while some stayed in Anatolia. The migration routes to the Anatolia during the glacial period is represented on Map-1.

When we look at Map-1, the dispersal of the Siberian and Eremial elements entering Anatolia from the East side of Diagonal, and Arboreal and Mediterranean elements entering Anatolia from the West side, could be hindered by this Diagonal Line itself in Anatolia.

In this work, as much literature of Turkey's Orthoptera as possible have been collected and reviewed in the references numbered as 1-38. In the light of our own studies as well as the related literature the dispersal of the Orthoptera have been determined and they were evaluated in relation to the Anatolian Diagonal. The dispersal of the species whose diversity are specific to the East and West side of the Diagonal were compared with those of districts neighbouring Anatolia. In the end, it has been attempted to determine whether there has been gap or disruption of the Turkey's Orthoptera in relation to the hypothetical Diagonal in question.



Map-1. Zoogeographical map of Asia Minor (reprinted from Demirsoy, 1979).

Results

Up to now 138 genera belonging to the order of Orthoptera have been determined by various authors. In our present work, it has been found that the taxa (species-subspecies) of 36 genera out of these 138 genera are present only in the West side of Diagonal, and the taxa of 23 genera are present only in the East side of Diagonal. The other taxa of remaining 79 genera are present in either the East or West, or both side of Diagonal.

According to the knowledge obtained from both references and from our studies, about 480 orthopteran taxa (species-subspecies) were published for Turkey. Their distribution and percentage are demonstrated in Table 1.

Table 1. The distribution and percentage of the species- subspecies of Turkey's Orthoptera in relation to the Diagonal.

| | species-subspecies | % |
|-------------------|--------------------|-----|
| East of Diagonal | 131 | 27 |
| West of Diagonal | 210 | 44 |
| Over the Diagonal | 30 | 6 |
| On the both sides | 109 | 23 |
| TOTAL | 480 | 100 |

Those genera whose dispersal are specific to the Diagonal are generally monotypical. Nevertheless the polytypical genera are also present to some extent. The genus *Eupholidoptera* (Tettigoniidae) shows a typical Western distribution. However, only one species (*E. tauricola*) out of 17 has been found in the East of the Diagonal around Elazig-Harput, (Map-2). In addition, the other species of *Eupholidoptera* were determined as shown in following:

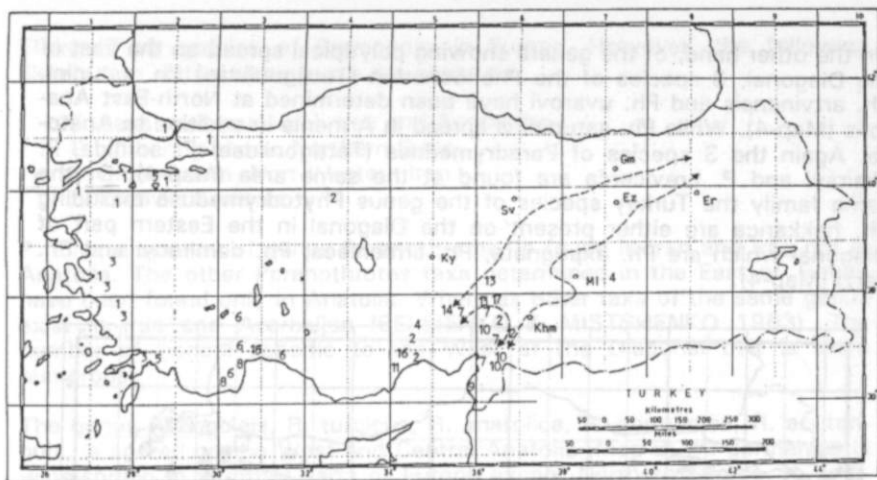
- *E. smyrnensis*, Aegean islands, Bulgaria and Western Anatolia
- *E. wernerii*, Syria and South Anatolia
- *E. parasina*, Aegean Islands and West Anatolia
- *E. cypria turcica*, South Anatolia (one subspecies of this species was found in Cyprus)

The following species has not been found outside of Anatolia:

| | | |
|------------------------|---------------------|-----------------------|
| <i>E. annulipes</i> | <i>E. sevketi</i> | <i>E. tahtalica</i> |
| <i>E. krueperi</i> | <i>E. anatolica</i> | <i>E. raggei</i> |
| <i>E. ummimaculata</i> | <i>E. karabagi</i> | <i>E. marashensis</i> |
| <i>E. mersinensis</i> | <i>E. demirsoyi</i> | <i>E. tauricola</i> |

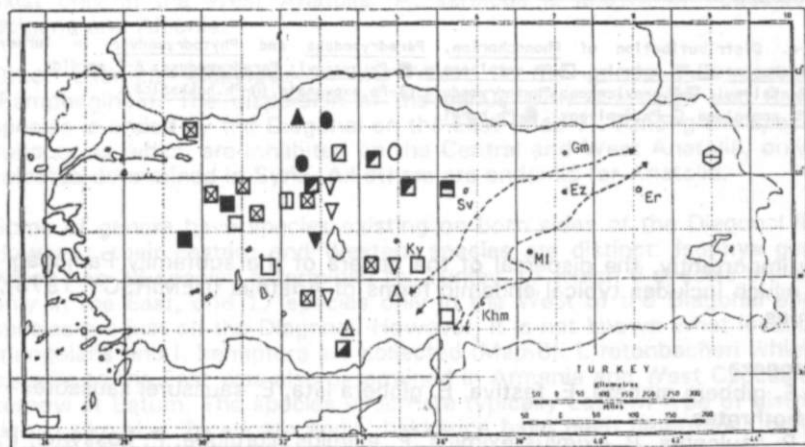
However, other *Eupholidoptera* species are found in Europe.

Similarly, *G. arasi* is the only species belonging to the total 16 *Glyphomethis* (Pamphagidae) species-subspecies given for the East - around Kars- (Map-3). The rest of *Glyphomethis* taxa show dispersal in the Central and Southern Anatolia. In Europe only *G. heldrichi* species exists. This species does not exist in Anatolia but other taxa are endemic for Anatolia.



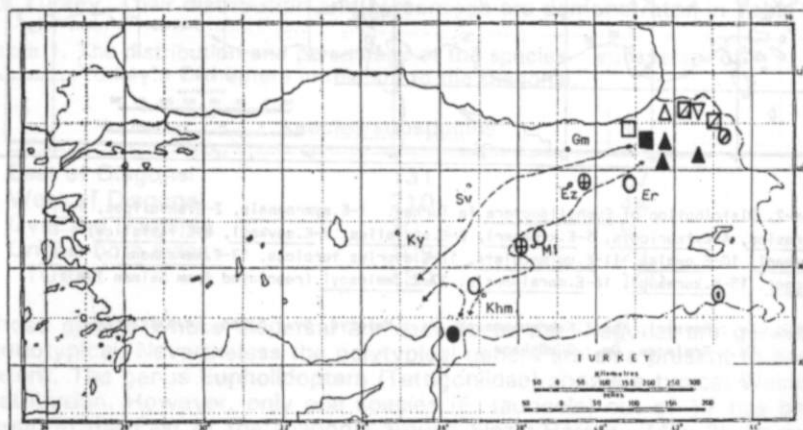
Map-2. Distribution of *Eupholioptera* in Turkey. 1-*E. symnensis*, 2-*E. annulipes*, 3-*E. parasina*, 4-*E. tauricola*, 5-*E. krueperi*, 6-*E. anatolica*, 7-*E. sevketi*, 8-*E. tahtalica*, 9-*E. vernerii*, 10-*E. excisa*, 11-*E. umimaculata*, 12-*E. cyprius turcicus*, 13-*E. marashensis*, 14-*E. raggei*, 15-*E. karabagi*, 16-*E. mersinensis*, 17-*E. demirsoyi* (reprinted from Salman 1983).

Abb.: Ky.: Kayseri, Khm.: Kahramanmaraş, Mi.: Malatya, Sv.: Sivas, Er.: Erzurum, Ez.: Erzincan, Gm.: Gümüşhane



Map-3. Distribution of *Glyphomethis* in Turkey. Δ -*G. holtzi holtzi*, \blacktriangle -*G. holtzi extimus*, ∇ -*G. holtzi pulcripes*, \blacktriangledown -*G. holtzi spinosus*, \square -*G. dimorphus dimorphus*, \blacksquare -*G. dimorphus armenus*, \boxtimes -*G. ovipennis*, \boxplus -*G. escherichi escherichi*, \boxminus -*G. escherichi coloripes*, \boxdot -*G. escherichi elstori*, \circ -*G. sevketi*, \bullet -*G. inermis*, \blacksquare -*G. adalae adalae*, \blacksquare -*G. adalae angorensis*, \ominus -*G. arasi*, \square -*G. raggei* (locality is unknown).

On the other hand, of the genera showing polytypical spread on the East of the Diagonal, 3 species of the **Phonochorion** (Tettigoniidae) *Ph. satunini*, *Ph. artvinensis* and *Ph. uvarovi* have been determined at North-East Anatolia (Map-4). While *Ph. satunini* is spread in Armenia in addition to Anatolia. Again the 3 species of **Paradrymedusa** (Tettigoniidae) *P. sordida*, *P. aksirayi* and *P. brevicerca* are found at the same area (Map-4). Of the same family the Turkey species of the genus **Phytodrymedusa** excluding *Ph. hakkarica* are either present on the Diagonal in the Eastern part of Diagonal which are *Ph. expugnata*, *Ph. armeniaca*, *Ph. demirsoyi* and *Ph. harzi* (Map-4).



Map-4. Distribution of *Phonochorion*, *Paradrymedusa* and *Phytodrymedusa* in Turkey.
Phonochorion: □-*Ph. satunini*, ▤-*Ph. artvinensis*, ■-*Ph. uvarovi*; *Paradrymedusa*: △-*P. sordida*, ▲-*P. aksirayi*, ▽-*P. brevicerca*; *Phytodrymedusa*: ○-*Ph. expugnata*, ⊙-*Ph. hakkarica*, ⊖-*Ph. armeniaca*, ⊕-*Ph. demirsoyi*, ●-*Ph. harzi*.

Very importantly, the dispersal of the genera of the subfamily Pamphaginae which includes typical endemic forms of Anatolia (DEMIRSOY 1973), such as

Eremopeza

- *E. gibbera gibbera*, *E. festiva*, *E. gibbera lata*, *E. saussurei saussurei* -

Paranothrotres

- *P. asulcatus*, *P. eximius eximius*, *P. eximius nigroloba*, *P. kosswigi*, *P. levis*, *P. gotvendidicus gotvendidicus*, *P. opacus hakkaricana* -

are westernly limited by the Diagonal (and there is no passage to the West) (Map- 5).

There is no species of *Eremopeza* in Europe. However, the following distribution of the same genus are observed:

- *E. saussurei saussurei*, Iran and Azerbaijan
- *E. gibbera gibbera*, Northern Syria
- *E. gibbera lata*, North-Western Iran
- *E. festiva*, Armenia

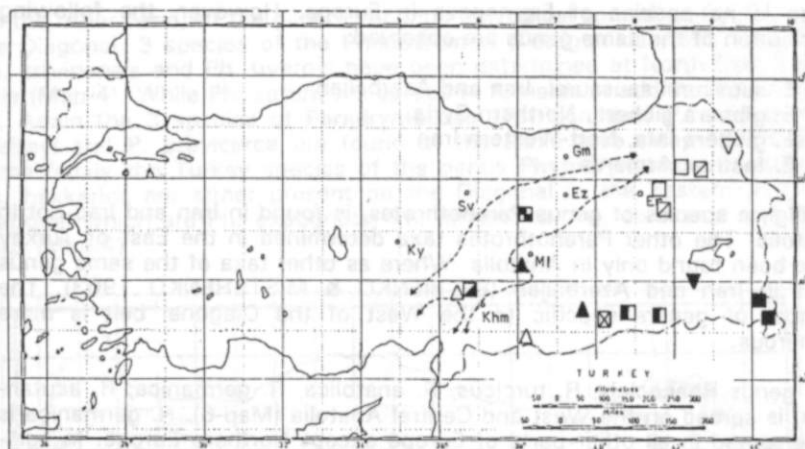
P. tölgi, a species of genus ***Paranothrotes***, is found in Iran and Iraq not in Anatolia. The other *Paranothrotes* taxa determined in the East of Turkey have been found only in Anatolia. Where as other taxa of the same genus exist in Iran and Azerbaijan (BEI-BIENKO & MISTSHENKO 1963). The number of genera specific to the West of the Diagonal belt is more numerous.

The genus ***Rhacocleis***, *R. turcicus*, *R. anatolica*, *R. germanica*, *R. acutangula*, is spread on the West and Central Anatolia (Map-6). *R. germanica* is wide-spread in all other parts of Europe except Northern Europe. In addition, *R. graeca* species, which is recorded for Greece, is not recorded in Anatolia. The genus ***Anadolua*** is endemic for Anatolia (Map-6). The species *A. schwarzi*, *A. rammei*, *A. burri* and *A. davisii* in this genus are observed in South-West and West Anatolia.

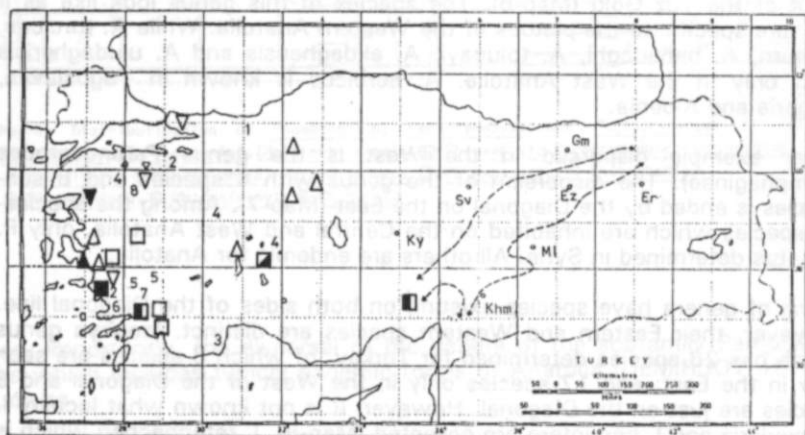
The genus ***Anterastes*** which has specific distribution to the West of the Diagonal, has 8 species determined for Turkey. These are spread on the West of the Tuz Gölü (Map-6). The species of this genus look like as if they are specific to the plateaus of the Western Anatolia. While *A. turcicus*, *A. burri*, *A. babadaghi*, *A. tolunayi*, *A. akdagensis* and *A. uludagensis* exist only in the West Anatolia. *A. serbicus* is known in Yugoslavia, Bulgaria and Albania.

Other example dispersed in the West is the genus ***Paranocarodes*** (Pamphaginae). The dispersion of the genus with 4 species and 8 subspecies is ended by the Diagonal on the East (Map-7). Among the species-subspecies which are inhabited on the Central and West Anatolia, only *P. sulcatus* determined in Syria. All others are endemic for Anatolia.

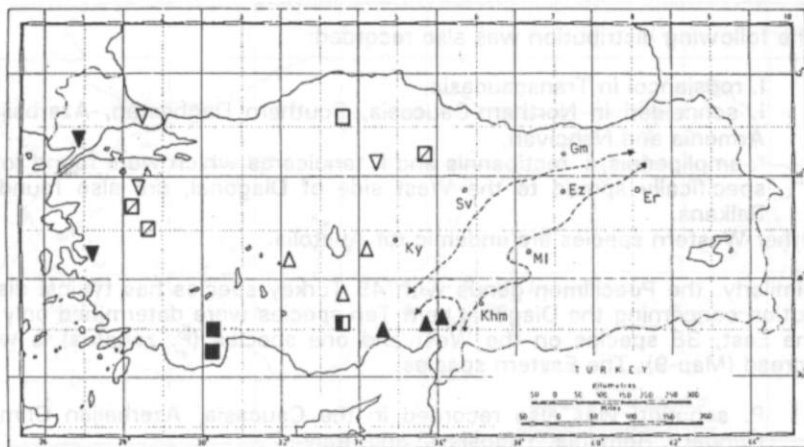
Some of genera have species existing on both sides of the Diagonal line. However, their Eastern and Western species are distinct. ***Isophya*** genus which has 28 species determined for Turkey, of which 6 species are seen only in the East, and 17 species only in the West of the Diagonal and 3 species are just on the Diagonal. However, it is not known what locality *I. triangularis* and *I. hemiptera* are collected (Map-8). *I. retenbacheri* which is specific to the East was also determined in Armenia and West Caucasia; *I. zernovi* at Batum. The species which are typically Eastern type of distribution *I. sikorai*, *I. bicarinata* and *I. hakkarica* have been determined only in Anatolia. *I. savignyi* which has a dispersion over the Diagonal can also be seen in Syria, Jordan and Palestine.



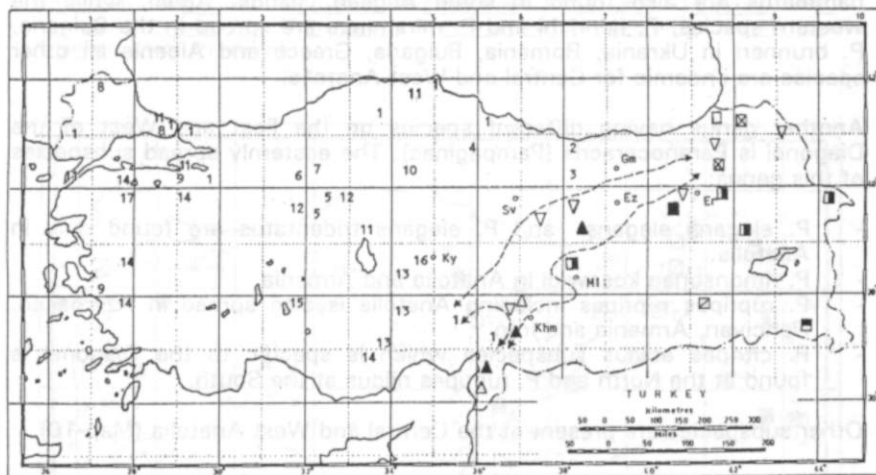
Map-5. Distribution of *Eremopeza* and *Paranotrotes* in Turkey. *Eremopeza*: Δ -*E.gibbera gibbera*, \blacktriangle -*E.gibbera lata*, ∇ -*E.festiva*, \blacktriangledown -*E.saussurei saussurei*; *Paranotrotes*: \square -*P.sulcatus*, \boxtimes -*P.eximius eximius*, \blacksquare -*P.eximius nigroloba*, \blacksquare -*P.kosswigi*, \blacksquare -*P.levis*, \blacksquare -*P.opacus hakkericana*, \boxtimes -*P.gotwendicus gotwendicus*.



Map-6. Distribution of *Rhacocleis*, *Anadolua* and *Anterastes* in Turkey. *Rhacocleis*: Δ -*R.turcicus*, \blacktriangle -*R.anatolica*, ∇ -*R.germanica*, \blacktriangledown -*R.acutangula*; *Anadolua*: \square -*A.schwarzii*, \blacksquare -*A.rammel*, \blacksquare -*A.burri*, \blacksquare -*A.davisi*; *Anterastes*: 1-*A.serbicus*, 2-*A.anatolicus*, 3-*A.turcicus*, 4-*A.burri*, 5-*A.babadaghi*, 6-*A.tolunayi*, 7-*A.akdagensis*, 8-*A.uludaghensis*.



Map-7. Distribution of *Paranocarodes* In Turkey. Δ -*P.beieri*, \blacktriangle -*P.sulcatus*, ∇ -*P.straubel*, \blacktriangledown -*P.straubel serratus*, \square -*P.straubel paphlagonicus*, \boxtimes -*P.fieberti fieberti*, \blacksquare -*P.fieberti tolunayi*, \blacksquare -*P.fieberti anatoliensis*.



Map-8. Distribution of *Isophya* In Turkey. \square -*I.retenbacheri*, \boxtimes -*I.sikora*, \boxtimes -*I.zernovi*, \blacksquare -*I.bicarinata*, \blacksquare -*I.hakkerica*, \blacksquare -*I.kosswigi*, Δ -*I.savignyi*, \blacktriangle -*I.rodsjancovi*, ∇ -*I.schneideri*, 1-*I.amplipennis*, 2-*I.reticulata*, 3-*I.sureyal*, 4-*I.acuminata*, 5-*I.nervosa*, 6-*I.ilkazli*, 7-*I.obtusidens*, 8-*I.tenulcerca*, 9-*I.rectipennis*, 10-*I.stenocauda*, 11-*I.pavellig*, 12-*I.karabagi*, 13-*I.major*, 14-*I.straubel*, 15-*I.anatolica*, 16-*I.pantheri*, 17-*I.canis*, 18-*I.triangularis*, *I.hemiptera* (locality is unknown).

The following distribution was also recorded:

- *I. rodsjancoi* in Transcaucasia,
- *I. schneideri* in Northern-Caucasia, Southern Daghestan, Azerbaijan, Armenia and Nahcivan,
- *I. amplipennis*, *I. rectipennis* and *I. tenuicerca* which were found to be specifically spread to the West side of Diagonal, are also found in Balkans.

Other Western species are endemic for Anatolia.

Similarly, the **Poecilimon** genus with 49 Turkey species has typical distribution concerning the Diagonal belt. Ten species were determined only on the East, 38 species on the West and one species (*P. zonatus*) is wide spread (Map-9). The Eastern species:

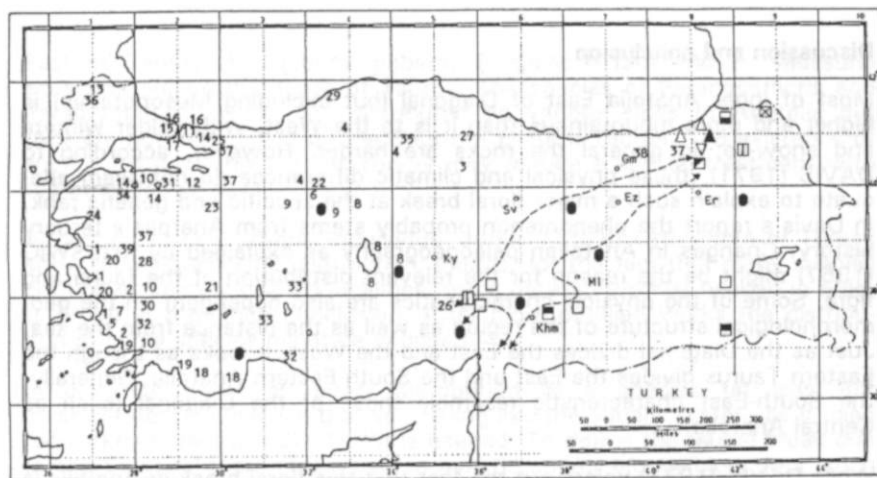
- *P. schmidtii* was also recorded in the Caucasus, Azerbaijan, Crimea, Hungary, Romania, Yugoslavia and Italy
- *P. similis* in Caucasus, Daghestan, Azerbaijan and Armenia;
- *P. djaconovi* in Caucasus;
- *P. syriacus* in Syria, Lebanon, Palestine and Israel. The other Eastern species *P. rammei*, *P. tschorensis*,
- *P. variicercis*, *P. harveyi*, *P. tauricola* and *P. raggei* are all endemic for Anatolia.

The species determined in the West including *P. sanctipauli* and *P. hammatu*s are also found in some Aegean Islands. Again, while the western species, *P. henrichi* and *P. mirammae* are spread in the Bulgaria, *P. brunneri* in Ukraine, Romania, Bulgaria, Greece and Albania all other species are endemic for Central and West Anatolia.

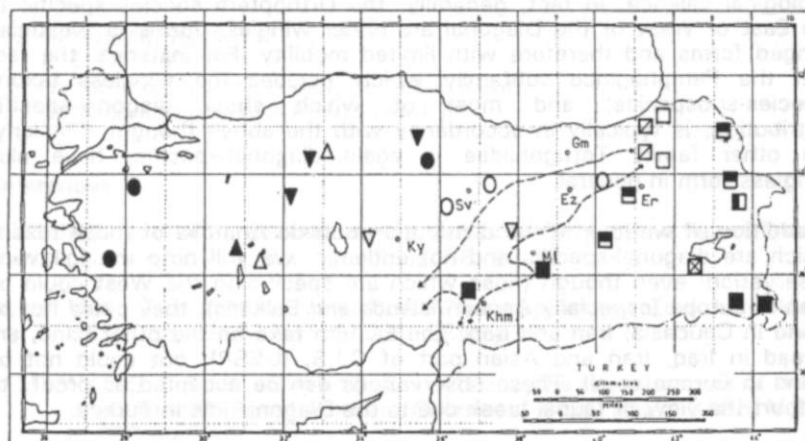
Another genus having different species on the East and West of the Diagonal is **Paranocaracris** (Pampaginae). The easternly spread subspecies of this genus:

- *P. elegans elegans* and *P. elegans tridentatus* are found only in Anatolia.
- *P. rimonsoneae kosswigi* in Anatolia and Armenia
- *P. rupripes rupripes* including Anatolia is also spread in Azerbaijan, Nahcivan, Armenia and Iran
- *P. citripes acinus* subspecies which is specific to the Diagonal is found at the North and *P. rupripes rijidus* at the South.

Other subspecies are present at the Central and West Anatolia (Map-10).



Map-9. Distribution of *Poecilimon* in Turkey. Δ -*P.schmidtii*, \blacktriangle -*P.rammei*, \blacksquare -*P.harveyi*, ∇ -*P.tschorochensis*, \blacktriangledown -*P.varilicercis*, \square -*P.syracus*, \boxtimes -*P.djavanovi*, \square -*P.tauricola*, \blacksquare -*P.raggel*, \blacksquare -*P.similis*, \bullet -*P.zonatus*, \circ -*P.sanctipauli*, \circ -*P.hammatu*, \circ -*P.conicus*, \circ -*P.cervus*, \circ -*P.lodereri*, \circ -*P.luschni*, \circ -*P.izmirnensis*, \circ -*P.exclusus*, \circ -*P.uvarovi*, \circ -*P.ammisus*, \circ -*P.zimmeri*, \circ -*P.turciae*, \circ -*P.henrichi*, \circ -*P.anatolicus*, \circ -*P.mirammeae*, \circ -*P.bosporus*, \circ -*P.bidens*, \circ -*P.brandi*, \circ -*P.inflatus*, \circ -*P.pulcher*, \circ -*P.angularatus*, \circ -*P.glandifer*, \circ -*P.kutahiyensis*, \circ -*P.pergamicus*, \circ -*P.adentatus*, \circ -*P.haydari*, \circ -*P.neglatu*, \circ -*P.unispinosus*, \circ -*P.celebi*, \circ -*P.tuncayli*, \circ -*P.rammeanus*, \circ -*P.bilgeri*, \circ -*P.davisi*, \circ -*P.turcicus*, \circ -*P.xenocercus*, \circ -*P.brunneri*, \circ -*P.sureyyanus*, \circ -*P.bischoffi*, \circ -*P.minitus*, *P. incertus* (locality unknown).



Map-10. Distribution of *Paranocarex* in Turkey. Δ -*P.citripes idrisi*, \blacktriangle -*P.citripes citripes*, ∇ -*P.citripes bicoloripes*, \blacktriangledown -*P.rupripes bodenheimeri*, \bullet -*P.rupripes burri*, \square -*P.elegans elegans*, \boxtimes -*P.elegans tridentatus*, \boxtimes -*P.rimonsonae kossigii*, \blacksquare -*P.rupripes rupripes*, \blacksquare -*P.rupripes rigidus*, \blacksquare -*P.rupripes subrubrata*, \circ -*P.rupripes acinosus*.

Discussion and conclusion

Most of inner Anatolia East of Diagonal (but excluding Mesopotamia) is higher and more mountainous than it is to the West, with colder winters and snow-lie; in general the rocks are harder. However, according to DAVIS (1971), these physical and climatic differences do not seem adequate to explain such a major floral break at the specific and generic rank. In Davis's report the phenomenon probably stems from Anatolia's tertiary history. Changes in Anatolian paleogeography as explained by KOSSWIG (1967) might be the reason for the relevant distribution of the fauna and flora. Some of the physical characteristics are also dependent on the geomorphological structure of the region as well as the distance from the sea. Just as the Diagonal divides the East and the West, it looks as though the Eastern Taurus divides the East and the South-Eastern Anatolia. Generally, the South-East characteristic resemble those of the Diagonal (such as Central Anatolia).

While DAVIS (1971) points out the fact that this floral break in Anatolia is due to paleogeographical changes in tertiary, EKIM & GÜNER (1986) explain these differences with the ecological and climatic factors. However, this hypothetical Diagonal can be accepted as a high altitude forming a typical ecological barrier in conjunction with other characteristics of this altitude. The distribution of species can be determined by the continuity and/or similarity of the habitat. If we consider this point together with the discontinuity (break) of the Diagonal, it may easily be possible to explain the differences between the Eastern and Western type of the distribution of the species as pointed out by DEMIRSOY (1979).

As we pointed out previously, the effect of the Diagonal must be more distinctive on those species with limited mobility and/or with restricted ecological valence. In fact, generally, the Orthoptera species specific to the East or West of the Diagonal are either wingless forms or westigial-winged forms and therefore with limited mobility. For instance, the fact that the Pamphaginae subfamily which includes the wingless taxa (species-subspecies) and most of which show diagonal-specific distribution, is typically in accordance with the above thought. Similarly, the other family Tettigoniidae is again diagonal-specific, have also wingless form in general.

In addition, if we look at the distribution outside Anatolia of those taxa which are diagonal-specific and not endemic, we will note the following observation: even though those which are specific to the West could be seen in Europe (especially Aegean Islands and Balkans), they could not be found in Caucasus, Iran and Iraq. The Eastern taxa on the other hand, are spread in Iraq, Iran and Asian part of C.I.S. (USSR), but could not be found in Europe at all. These observations can be accepted as proofs to support the view of faunal break due to the Diagonal line in Turkey.

As well as the Diagonal, it looks as though there may be a side-break between East and South-East Turkey due to the Eastern Taurus mountains. For example, while *Eremopeza festiva* is spread on the North of the

Eastern Taurus; *E. gibbera gibbera*, *E. gibbera lata* and *E. saussurei saussurei* are on the south of Taurus. The species of *Paranocaracris* and *Paradrymedusa* genera are distributed on various sides of Anatolia but they are not determined on the South of Eastern Taurus. The existence of such a break in this part of Turkey may require a special treatment with the other faunal data.

According to our present knowledge, about 71% of Orthoptera of Turkey show diagonal-specific distribution. Indeed, for the fact that many species are known from restricted localities, more detailed work is needed in order to arrive at a definite conclusion. After more detailed works the distribution of some species might be widened.

In order to know an exact distribution of a species (at least for invertebrates) we believe that something like the square system as it used for Turkey's flora (DAVIS 1965) is needed. To define the faunal break due to the Diagonal more clearly, some genetic and/or biochemical data (such as enzyme polymorphism), may be necessary as well as the knowledge on bridge points between the gene pools of some distinct populations of Orthoptera fauna if existed at all.

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List of Species and Genera (used in the text)

Fam. ACRIDIDAE

- Gomphocerus Thunberg, 1815
- Oedipoda germanica meridionalis Ramme, 1913
- Dociostaurus (Dociostaurus) brevicolis Eversman, 1848
- Dociostaurus (Stauronotulus) cappadocicus Azam, 1913
- Tripodopola longicornis Uvarov, 1934

Fam. TRYDACTYLIDAE

- Trydactylus irremipes Uvarov, 1934

Fam. TETTIGONIIDAE

- Leptophyes Fieber, 1853
- Platycleis Fieber, 1853
- Drymedusa Stein, 1860

Genus: Eupholidoptera Ramme, 1951

- E. anatolica (Ramme, 1930)
- E. annulipes (Brunner, 1882)
- E. cypria tucica Salman, 1983
- E. demirsoyi Salman, 1983
- E. karabagi Salman, 1983
- E. krueperi (Ramme, 1930)
- E. marashensis Salman, 1983
- E. smyrnensis (Brunner, 1882)
- E. prasina (Brunner, 1882)
- E. tauricola (Ramme, 1930)
- E. sevketi (Ramme, 1933)
- E. tahtalica (Uvarov, 1949)
- E. wernerii Ramme, 1951
- E. umimaculata (Karabag, 1956)

- E. raggei Salman, 1983
- E. excisa (Karabag, 1952)

Genus Rhacocleis Fieber, 1853

- R. turcicus (Uvarov, 1930)
- R. anatolica Werner, 1933
- R. germanica (Herr.- Sac., 1840)
- R. acutangula Karabag, 1957

Genus Anadolua Ramme, 1939

- A. burri Karabag, 1952
- A. davisii Karabag, 1952
- A. rammei Karabag, 1952
- A. schwarzi Ramme, 1939

Genus Anterastes Br.-Wt., 1882

- A. serbicus Br.-Wt., 1882
- A. anaticus Ramme, 1951
- A. turcicus Karabag, 1951
- A. burri Karabag, 1951
- A. babadaghi Uvarov, 1939
- A. tolunayi Karabag, 1951
- A. akdagensis Ramme, 1951
- A. uludaghensis Karabag, 1950

Genus Phonochorion Uvarov, 1916

- Ph. satunini Uvarov, 1916
- Ph. artvinensis Bei-Bienko, 1954
- Ph. uvarovi Karabag, 1956

Genus Paradyrmedusa Herman, 1874

- P. aksirayi Karabag, 1952
- P. brevicerca Karabag, 1956
- P. uvarovi Herman, 1874

Genus Phytodyrmedusa Ramme, 1939

- Ph. armeniaca Ramme, 1939
- Ph. demirsoyi Karabag, 1956
- Ph. expugnata (Uvarov, 1916)
- Ph. hakkarica Karabag, 1956
- Ph. harzi Karabag, 1975

Genus Isophya Br.-Wt., 1878

- I. redtenbacheri Adelung, 1907
- I. sikorai Ramme, 1951
- I. zernovi Miram, 1938
- I. bicarinata karabag, 1957
- I. hakkarica Karabag, 1961
- I. kosswigi Demirsoy, 1975
- I. savignyi Br.-Wt., 1878
- I. rodsjankoi I. Bolivar, 1899

- I. schneidleri Br.-Wt., 1878
- I. angulata Br.-Wt., 1878
- I. reticulata Ramme, 1951
- I. aurea Ramme, 1951
- I. acuminata Br.-Wt., 1878
- I. nervosa Ramme, 1951
- I. likai Ramme, 1951
- I. obtusidens Ramme, 1951
- I. tenuicornis Ramme, 1951
- I. rectipennis Br.-Wt., 1878
- I. stenoscutus Ramme, 1951
- I. davisii Br.-Wt., 1878
- I. karabagi Uvarov, 1940
- I. major Br.-Wt., 1878
- I. sticticus (Fieber, 1853)
- I. anatolica Ramme, 1951
- I. parisi Ramme, 1951
- I. caris Karabag, 1975
- I. thersites Br.-Wt., 1897
- I. hemiptera Bei-Bienko, 1954
- Genus Pochilium Fischer, 1853
- P. schmidtii (Fieber, 1853)
- P. rammei Miram, 1938
- P. harveyi Karabag, 1954
- P. tachirochensis Adelung, 1907
- P. varicosa Miram, 1938
- P. syriacus Br.-Wt., 1897
- P. blakowski Miram, 1938
- P. laudolia Ramme, 1951
- P. taggar Karabag, 1975
- P. similis Retzowski, 1899
- P. zonatus I. Bolivar, 1899
- P. sarichipoli Br.-Wt., 1878
- P. hemipterus Br.-Wt., 1878
- P. conicus Br.-Wt., 1878
- P. carus Karabag, 1950
- P. lebechei Ramme, 1933
- P. lucasii Ramme, 1933
- P. izmiriensis Ramme, 1933
- P. excisus Karabag, 1950
- P. uvarovi Ramme, 1933
- P. armatus Br.-Wt., 1878
- P. thersites Ramme, 1933
- P. lucasii (Ramme, 1951)
- P. harachi Ramme, 1951
- P. unicolor Ramme, 1933
- P. miramas Ramme, 1933
- P. pachyphorus Br.-Wt., 1878
- P. bibana Retzowski, 1899

- *I. schneideri* Br.-Wt., 1878
- *I. amplipennis* Br.-Wt., 1878
- *I. reticulata* Ramme, 1951
- *I. sureyai* Ramme, 1951
- *I. acuminata* Br.-Wt., 1878
- *I. nervosa* Ramme, 1951
- *I. ilkazi* Ramme, 1951
- *I. obtusidens* Ramme, 1951
- *I. tenuicercus* Ramme, 1951
- *I. rectipennis* Br.-Wt., 1878
- *I. stenocauda* Ramme, 1951
- *I. paveli* Br.-Wt., 1878
- *I. karabagi* Uvarov, 1940
- *I. major* Br.-Wt., 1878
- *I. straubei* (Fieber, 1853)
- *I. anatolica* Ramme, 1951
- *I. pantheri* Ramme, 1951
- *I. cania* Karabag, 1975
- *I. triangularis* Br.-Wt., 1891
- *I. hemiptera* Bei-Bienko, 1954

Genus *Poecilimon* Fischer, 1853

- *P. schmidti* (Fieber, 1853)
- *P. rammei* Miram, 1938
- *P. harveyi* Karabag, 1964
- *P. tschorochensis* Adelung, 1907
- *P. variicercis* Miram, 1938
- *P. syriacus* Br.-Wt., 1891
- *P. djakonovi* Miram, 1938
- *P. tauricola* Ramme, 1951
- *P. raggei* Karabag, 1975
- *P. similis* Retowski, 1889
- *P. zonatus* I. Bolivar, 1899
- *P. sanctipauli* Br.-Wt., 1878
- *P. hammatu* Br.-Wt., 1878
- *P. conicus* Br.-Wt., 1878
- *P. cervus* Karabag, 1950
- *P. ledereri* Ramme, 1933
- *P. luschani* Ramme, 1933
- *P. izmirmensis* Ramme, 1933
- *P. excisus* Karabag, 1950
- *P. uvarovi* Ramme, 1933
- *P. ammisus* Br.-Wt., 1878
- *P. zimmeri* Ramme, 1933
- *P. turciae* (Ramme, 1951)
- *P. henrichi* Ramme, 1951
- *P. anaticus* Ramme, 1933
- *P. miramae* Ramme, 1933
- *P. bosphoricus* Br.-Wt., 1878
- *P. bidens* Retowski, 1889

- *P. birandi* Karabag, 1950
- *P. inflatus* Br.-Wt., 1891
- *P. pulcher* Br.-Wt., 1891
- *P. angulatus* Uvarov, 1939
- *P. glandifer* Karabag, 1950
- *P. kutahiyensis* Werner, 1901
- *P. pergamicus* Br.-Wt., 1891
- *P. adentatus* Ramme, 1933
- *P. haydari* Ramme, 1951
- *P. neglectus* Ramme, 1931
- *P. unispinosus* Br.-Wt., 1878
- *P. celebi* Karabag, 1953
- *P. tuncayi* Karabag, 1953
- *P. rammeanus* Karabag, 1953
- *P. bilgeri* Karabag, 1953
- *P. davisii* Karabag, 1953
- *P. turcicus* Karabag, 1950
- *P. xenocercus* Karabag, 1956
- *P. buruneri* Frivaldski, 1867
- *P. sureyanus* Uvarov, 1930
- *P. bischoffi* Ramme, 1933
- *P. minitus* Karabag, 1975
- *P. incertus* Targioni, 1881

Fam. PAMPHAGINAE

- *Ebnerodes* Ramme, 1951
- *Nocaracris* Uvarov, 1928
- *Tmethis* Fieber, 1853

Genus *Glyphomethis* Bei-Bienko, 1851

- *G. holtzi holtzi* (Werner, 1901)
- *G. holtzi extimus* Bei-Bienko, 1951
- *G. holtzi pulchripes* (Uvarov, 1934)
- *G. holtzi spinosus* Karabag, 1956
- *G. dimorphus dimorphus* (Uvarov, 1934)
- *G. dimorphus armenus* (Ramme, 1951)
- *G. ovipennis* (Uvarov, 1934)
- *G. escherichi escherichi* (Krauss, 1896)
- *G. escherichi coloripes* (Cejchan, 1965)
- *G. escherichi elatior* (Ramme, 1951)
- *G. sevketi* (Ramme, 1951)
- *G. inermis* (Uvarov, 1934)
- *G. adaliae adaliae* (Uvarov, 1928)
- *G. adaliae angorensis* (Cejchan, 1968)
- *G. raggei* (Cejchan, 1965)
- *G. helderichi* (Brunner, 1882)
- *G. arasi Salman*, 1978

Genus *Eremopeza* Saussure, 1888

- *E. gibbera gibbera* (Stal, 1876)
- *E. gibbera lata* (Uvarov, 1934)
- *E. festiva* (Saussure, 1884)
- *E. saussurei saussurei* (Uvarov, 1918)

Genus *Paranothrotres* Mistshenko, 1951

- *P. asulcatus* Demirsoy, 1977
- *P. eximius eximius* Mistshenko, 1951
- *P. eximius nigrogloba* Demirsoy, 1977
- *P. kosswigi* Demirsoy, 1977
- *P. levis* Mistshenko, 1951
- *P. opacus hakkaricana* Demirsoy, 1977
- *P. Ogotvendidus gotvendidus* (I. Bolivar, 1912)
- *P. tolgi* (Ebner, 1919)

Genus *Paranocarodes* I. Bolivar, 1916

- *P. beieri* Ramme, 1951
- *P. straubei straubei* (Fieber, 1853)
- *P. straubei serratus* Uvarov, 1949
- *P. straubei paphlagonicus* Ramme, 1951
- *P. fieberi fieberi* (Brunner-Wattenwyl, 1882)
- *P. fieberi tolunayi* Karabag, 1949
- *P. fieberi anatoliensis* Demirsoy, 1977
- *P. sulcatus* (I. Bolivar, 1912)

Genus *Paranocaracris* Mistshenko, 1951

- *P. citripes citripes* (Uvarov, 1949)
- *P. citripes idrisi* (Karabag, 1953)
- *P. citripes bicoloripes* (Uvarov, 1949)
- *P. rupripes rupripes* (Fischer-Waldheim, 1846)
- *P. rupripes bodenheimeri* (Uvarov, 1940)
- *P. rupripes burri* (Uvarov, 1943)
- *P. rupripes rigidus* Mistshenko, 1951
- *P. rupripes subrubrata* (Ramme, 1951)
- *P. rupripes acinosus* Mistshenko, 1951
- *P. elegans elegans* (Mistshenko, 1951)
- *P. elegans tridentatus* (Shcheltanoutsev, 1916)
- *P. rimonsoneae kosswigi* (Karabag, 1953)